Docket 2001US003
Serial No. 09/883,647
Group 2125

REMARKS

In a telephone interview with Examiner Frank of July 10, 2003, he indicated that this case was restricted into two groups:

Group I was drawn to a system of color matching 1-21, 24-29; and
Group II was drawn to a color swatch 22-23.

For purposes of Examination Applicants' have provisionally elected Group I reserving the right to traverse.

To be fully responsive to this restriction requirement, Applicants have cancelled claims 22 and 23. Applicants reserve the right to file one or more divisional applications to the non-elected subject matter.

In the specification page 9 line 8 the Method 200 was not found on Figure 6. Figure 6 has been amended to include the Method 200 label. See Replacement Sheet attached. On page 9 line 19, the specification has been amended to change 215 to 225. In view of these corrections, applicants traverse the objections to the specification and respectfully request that the specification be accepted as amended.

Claims 3,6,7,10,13,14,18,19,21,24 and 27-29 stand rejected under 35 USC §112, second paragraph, as being indefinite. The members of the Markush groups in claims 3,6,7,10,13,14,18,19,21,24 and 27-29 comply with the unity of invention clause in MPEP 803.02.

803.02 Restriction - Markush Claims
PRACTICE RE MARKUSH-TYPE CLAIMS

If the members of the Markush group are sufficiently few in number or so closely related that a search and examination of the entir claim can be made without serious burden, the examiner

must examine all the members of the Markush group in the claim on the merits, even though they are directed to independent and distinct inventions. In such a case, the examiner will not follow the procedure described below and will not require restriction.

Since the decisions in *In re Weber*, 580 F.2d 455, 198 USPQ 328 (CCPA 1978) and *In re Haas*, 580 F.2d 461, 198 USPQ 334 (CCPA 1978), it is improper for the Office to refuse to examine that which applicants regard as their invention, unless the subject matter in a claim lacks unity of invention. *In re Harnish*, 631 F.2d 716, 206 USPQ 300 (CCPA 1980); and *Ex parte Hozumi*, 3 USPQ2d 1059 (Bd. Pat. App. & Int. 1984). Broadly, unity of invention exists where compounds included within a Markush group (1) share a common utility, and (2) share a substantial structural feature disclosed as being essential to that utility.

For example in claim 3, unity of invention exists where compounds included within a Markush group (1) share a common utility, and (2) share a substantial structural feature disclosed as being essential to that utility. Here the dyestuff, dye specification, dyeing procedures, finishes, finishing procedures, preparation chemicals, preparation processes and combinations thereof, all contribute directly to the overall color of the final product. Therefore this information is critical to communicate to the dyehouse to insure a proper color match. There can be no question that this information (1) shares a common utility (outcome determinate data for color), and (2) share a substantial structural feature (capable of being quantified) disclosed as being essential to that utility. Here it is also true that combination of dye formulations with dyeing procedures or any of the other factors can also influence color so combinations of these features should also be proper. Applicants position with respect to unity of invention, detailed above is equally applicable to claims 3,6,7,10,13,14,18,19,21,24 and 27-29. Therefore, applicants respectfully request reconsideration and that the 35 U.S.C. 112, second paragraph, rejection be withdrawn.

Claims 8 and 29 stand rejected under 35 U.S.C. 112, second paragraph as being indefinite, for using the language "and combinations of both". Claims 8 and 29 have been amended to remove this language from the claims. Applicants traverse this rejection and respectfully request that the claims allowed.

Claim 2 stands rejected under 35 USC §112, second paragraph, as being indefinite. Claim 2 does not contain the language "and combinations thereof". The

applicants respectfully request the rejection to claim 2 be withdrawn and the claim be allowed.

Claims 1-6, 9-13, 16, 17-21, and 24-27 stand rejected under 35 USC §102 (e), as being anticipated by Priestley et al., (US 2002/0021439 A1). Applicants note the office's arguments in section 9 pages 4-6 of the Official Action and traverse. In Priestley et al., the initial step in all cases is the capture of an image of the article to be matched, a tooth for example. Any consequential color values are determined or measured from this image and not from the article. In the current application the color values and reflectance values are determined or measured directly from the engineered color standard (ECS). Furthermore, it would destroy the ability to overcome metamerism in the current application if the reflectance data were measured from a captured image of the ECS. Metamerism is the effect where two objects appear to be the same color when viewed under one illuminant (daylight for example), but do not appear the same under a different illuminant (cool white fluorescent for example). Metamerism occurs due to the objects having different spectral reflectance curves. Please see the attached excerpt from "The Measurement of Appearance", by Richard S. Hunter. In view of these arguments the applicants traverse the rejection based on Priestley et al., and respectfully request the claims be allowed.

Claims 7, 8, 14, 15, 28, and 29 stand rejected under 35 USC §103 (a), as being obvious over Priestley et al. in view of Wasinger et al. (US 5,633,722 A). Applicants note the office's arguments in section 11, on pages 7 and 8 of the Official Action, and traverse. Wasinger et al. uses a television camera as the method of determining the color of the textile being treated. As with the captured image above, the television camera will not be able to give a measurement that can overcome the metamerism between two objects. In the present invention the color is either inspected visually, or electronically. Electronically in the instant application involves reflectance data generated from a spectrophotometer, preferably correlated by color matching software. In the present application no visual image is captured, as is the case with both the

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Priestley and Wasinger references. In light of this and the arguments set forth above in regards to Priestley et al. the Applicants respectfully request the claims be allowed.

As the total number of claims does not exceed the number of claims originally paid for, no fee is believed due. However if an additional fee is required, the Commissioner is hereby authorized to credit any overpayment or charge any fee deficiency to Deposit Account No. 03-2060.

Entry of the above amendment is respectfully requested. The claims are fully supported by the specification.

Respectfully submitted,

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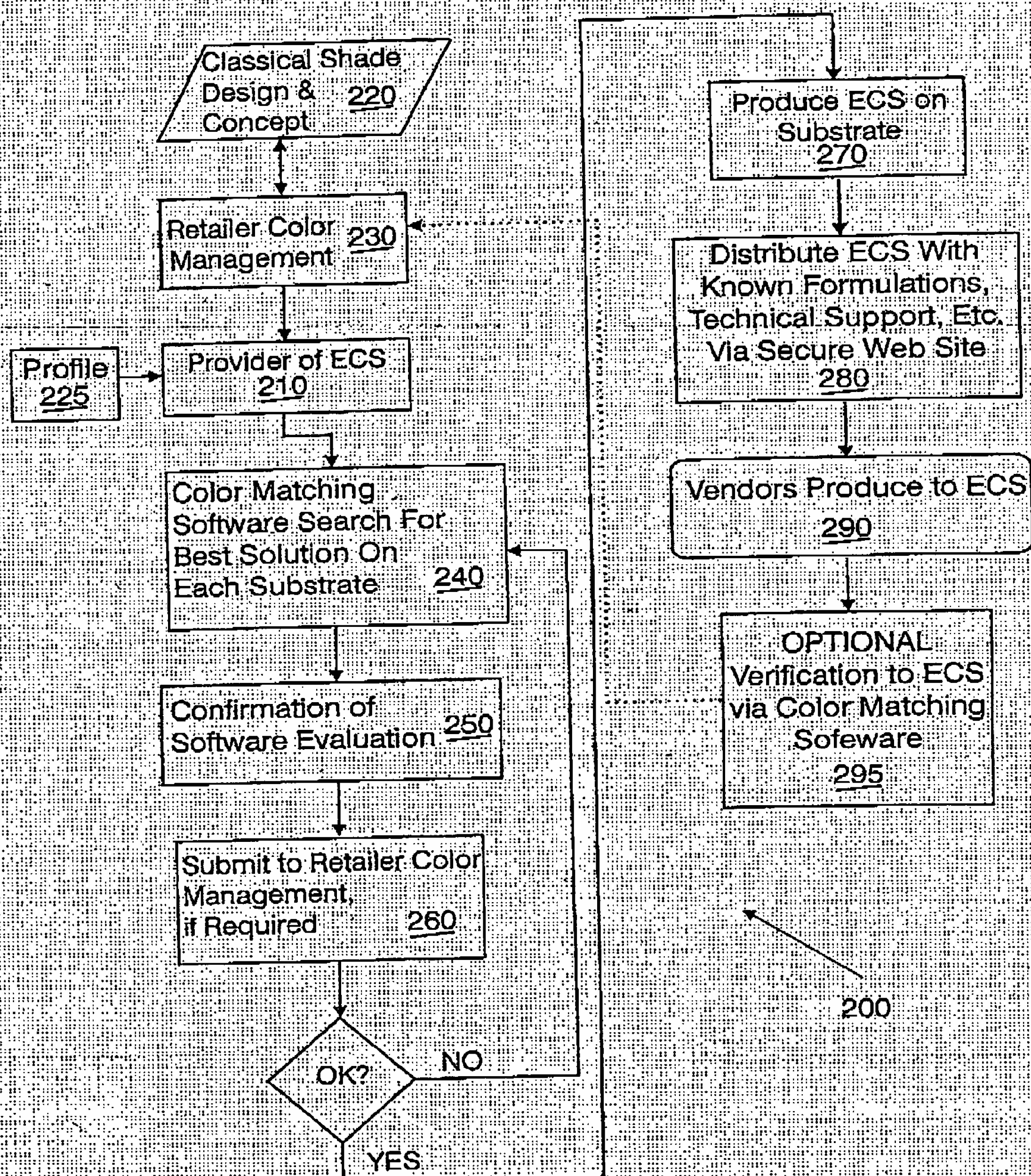
Replacement Sheet

Fig. 6



THE MEASUREMENT OF APPEARANCE

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PREFA

This book has been prepared to identify appearance attributes of objec the methods available for measuring them. It is designed to serve as t readable textbook and a reference work. As such it makes available muc terial not previously organized for ready reference.

The primary premise of the book is that "object appearance" involv only color, but also such attributes as gloss, luster, and translucency. C undeniably the most noticed of the appearance attributes, but the contrib of the others are vital to the identification of object appearance. Object si shape are also obviously important factors in overall appearance, but th outside the scope of this book. None of these factors can be ignored when ing a judgment about the appearance of an object, whether the judgm visual or instrumental.

In addition to being economically important, the way things lo inevitably a fascinating subject to everyone, since it is a major factor is daily experience. Because it has been such a constant part of our lives birth, our recognition of the appearance of objects and our judgments co ing them are astute, fast, and highly discriminating. To simulate thes pearance discriminations by measurements, analysis of the technical ba appearance must be known. An instrument to measure an appearance att cannot be built without knowing the physical sources of that attribute ar predictable human response to it.

With knowledge comes the realization that a complete physical specifi of all the factors that contribute to an object's appearance is too compl and cumbersome to be either attainable or useful. However, it is u feasible to make measurements of the specific attributes important for any problem. Specific methods for the measurement of color, gloss, opacity, ness, and the like are in widespread use in science and industry, and proved to be valid and extremely useful in identifying and controlling pr appearance.

Appearance specification is interdisciplinary in approach. The estab scientific fields of physics, physiology, psychology, psychophysics, and mat technology must all be brought into any complete discussion of appea

or, more properly, as an integral

$$X = \int_{400}^{700} S_\lambda \bar{x}_\lambda \, d\lambda$$

Depending on the mode of the stimulus, the spectral energy S of the stimulus will be computed differently. For an illuminant or aperture color, stimulus S_λ will equal E_λ, the energy from that source at each wavelength. For reflecting objects, S_λ will equal $E_\lambda R_\lambda$, the energy of the source reduced by the percent reflectance R_λ of the object at that wavelength.

In the preceding explanation we have considered only the X tristimulus value; Y and Z are computed in the same manner using, of course, the $\bar{y}$ and $\bar{z}$ Standard Observer functions.

Objects are seen as they relate to their surroundings, not in terms of the absolute level of light coming from them. Therefore, X, Y, Z specifications of objects are always made relative to the luminosity of a perfect white object (reflectance equal to 1.0 at each wavelength). The functions for objects thus become

$$X = 100\frac{\int E_\lambda R_\lambda \bar{x}_\lambda \, d\lambda}{\int E_\lambda \bar{y}_\lambda \, d\lambda} \qquad Y = 100\frac{\int E_\lambda R_\lambda \bar{y}_\lambda \, d\lambda}{\int E_\lambda \bar{y}_\lambda \, d\lambda} \qquad Z = 100\frac{\int E_\lambda R_\lambda \bar{z}_\lambda \, d\lambda}{\int E_\lambda \bar{y}_\lambda \, d\lambda}$$

By definition, the Y for the perfect white is always 100. The magnitudes of X and Z for the perfect white change with color of illuminant.

Object Color Computations for X, Y, Z

To convert spectral reflectance (or transmittance) curves to X, Y, Z, three methods of integration are available:

1. Weighted-ordinate integration
2. Selected-ordinate integration
3. Instrument (automatic) integration

The Weighted-Ordinate Integration Method for Computing X, Y, Z Values. Most color computations are carried out to determine appearance under one of the Standard Illuminants A, B, C, or one of the D's (see Chapter 4). In order to simplify computation, Standard Observer tables have been prepared in which the $\bar{x}$, $\bar{y}$, and $\bar{z}$ functions already have been multiplied at each wavelength by the spectral curves of these illuminants. Table A.4 shows these values for CIE Illuminants A, B, C, and D65. The tables are normalized so that the $\bar{y}E$ total is a multiple of 100, making the division by the $\bar{y}$ integral a matter of

moving a decimal point. Note that the column totals (or integrals) are no longer equal, since the functions have been modified for the illuminant. The weighted-ordinate method computes $E_\lambda R_\lambda \bar{x}_\lambda$, $E_\lambda R_\lambda \bar{y}_\lambda$ and $E_\lambda R_\lambda \bar{z}_\lambda$ at each wavelength, using Table A.4 and the reflectance curve of the object. These components are then added, and the three totals are divided by the $\bar{y}E$ column total. Table A.5 is an example of a weighted-ordinate calculation, using the yellow school-bus color (see Figure 7.5) as an example.

The Selected-Ordinate Integration Method. For this type of computation, the Standard Observer functions become three lists of selected wavelengths, one for each response function $\bar{x}$, $\bar{y}$, and $\bar{z}$. The intervals between selected wavelengths are small where the particular Standard Observer function is high and large where it is not. Figure 7.6 shows the wavelength spacing used for the $\bar{y}$ function and 30 selected coordinates for computation of Y. To compute X, Y, and Z values by the selected-ordinate method, the measured reflectance from the spectral curve of the object is taken at each of the selected-ordinate wavelengths for the desired illuminant. These reflectances are then added together and divided by the number of ordinates in the table.

Table A.6 shows lists of 30 selected ordinates for illuminants A, B, and C. Computations in the selected-ordinate method must account for the change in X and Z weighting with change in illuminant by multiplying the X and Z totals by constants specific for the illuminant involved. These constant factors are given at the bottom of the table.

Table A.7 illustrates the derivation of X, Y, Z values using the selected-ordinate method. The example used is the yellow school-bus color, the reflectance curve of which is shown in Figure 7.5.

Instrument Automatic Integration. Two distinctly different techniques exist for obtaining X, Y, and Z values without manual calculation. Some spectrophotometers have tristimulus integrators that compute X, Y, and Z while the curve is being drawn. In another wholly different type of instrument called a photoelectric tristimulus colorimeter, photodetector-filter arrangements are used optically to duplicate as closely as feasible the $\bar{x}$, $\bar{y}$, and $\bar{z}$ functions. When these photodetector-filter arrangements receive light from colored objects, they give signals closely proportional to X, Y, and Z.

METAMERISM

Metamerism is present when two objects having the same color appearance nevertheless have different spectral curves. The layman recognizes metamerism when two objects that match under one illuminant fail to match under a

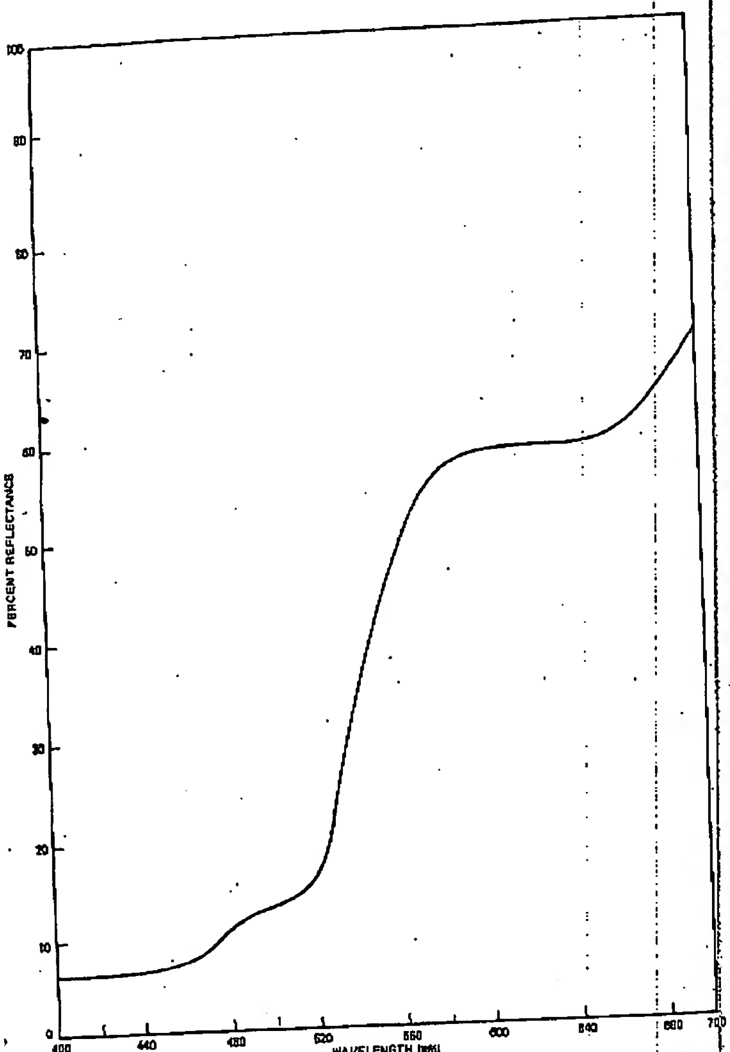

Figure 7.5. Spectrophotometric curve of yellow school bus. See Tables A.5 and A.7.

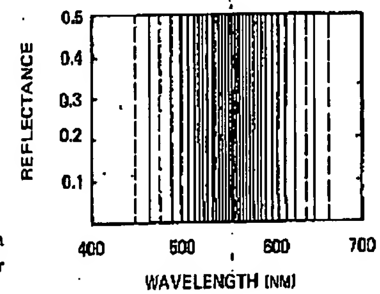

Figure 7.6. Template showing wavelength spacings used in selected ordinate method for integrating Y tristimulus value.

second. From the viewpoint of colorimetry, metamerism occurs when X, Y, and Z of two specimens match under the first illuminant but not the second. Metamerism is possible because the Standard Observer computations reduce an entire spectral curve to only three numbers. It is possible, and often happens, that two objects with different spectral curves will reduce to the same tristimulus specifications and will therefore be a visual match under one illuminant. However under a different illuminant (E_λ above) the spectral curves will change so that the tristimulus values X, Y, and Z may no longer match, and the two objects will not, therefore, be a visual match. Figure 7.7 shows curves of pairs of samples that exhibit metamerism.

CIE CHROMATICITY

The tristimulus values X, Y, and Z are limited in value as color specifications because they correlate poorly with any arrangement of visual attributes such as those described in Chapter 1. While Y correlates with lightness, X and Z by themselves do not correlate with hue, saturation, depth, vividness, redness-greenness, yellowness-blueness, or with any visually meaningful attribute of color appearance. When the Standard Observer was established, the CIE recommended a chromaticity system to identify those aspects of color appearance separate from lightness. For this purpose the Commission proposed that chromaticity coordinates x, y, and z (also called trichromatic coefficients) be defined as

$$x = \frac{X}{X+Y+Z} \qquad y = \frac{Y}{X+Y+Z} \qquad z = \frac{Z}{X+Y+Z}$$

Since the sum of x, y, and z will always be unity, only two of the chromaticity

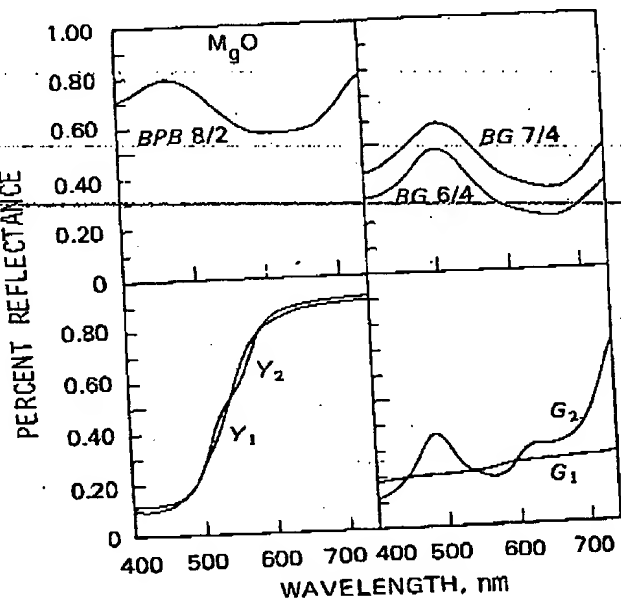

Figure 7.7 Spectral reflectance of pairs of samples exhibiting various degrees of metamerism. The upper two pairs differ considerably in color, but show little or no metamerism. The lower two pairs are near matches: the left pair is moderately metameric and the right pair is strongly metameric.

coordinates (the CIE recommended use of x and y) are needed to specify chromaticity. Neither x, y, nor z correlates with any of the meaningful attributes of color appearance. Taken together and incorporated into a chromaticity diagram, however, relationships of x and y with color appearance are developed.

The Chromaticity Diagram

For a visual display of chromaticities and their relationships, the CIE recommended a graph using x and y as axes. In such a graph the trichromatic coefficients ... (Table A.3) form a horseshoe-shaped curve within